

ABSTRACT

The invention is an improved fuel cell system suited for application in a vehicle. Specifically, the invention provides an improved system to remove CO emissions that has a rapid dynamic response (about 1 second) and can operate over a wide range of temperatures (between 0 and 800 degrees Celsius). The fuel cell system comprises hydrogen fuel, a CO removal system based upon non-Faradaic electrochemical modification of catalyst activity (electrochemical promotion), and a fuel cell stack. The CO removal system comprises a catalyst/working electrode, an electrolyte, a counter electrode, and a power source. The CO removal system's intrinsic catalytic rate is greater than an intrinsic electrocatalytic rate. The catalyst can be Pt, Rh, Au, Cu/ZnO, Cu/CuO, ABO₃(perovskite), zeolite, and Pd. The power source can be a battery, potentiostat, or galvanostat.